

AGILENT TECHNOLOGIES, INC.  
Legal Department, DL429  
Intellectual Property Administration  
P. O. Box 7599  
Loveland, Colorado 80537-0599



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ATTORNEY DOCKET NO. 10020307-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Marvin Glenn Wong, et al.

Serial No.: 10/620,127

Examiner: Patel, Ishwarbhai B.

Filing Date: July 15, 2003

Group Art Unit: 2841

Title: METHODS FOR PRODUCING AIR BRIDGES

COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on December 23, 2005.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) **\$500.00**.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)(1)-(5)) for the total number of months checked below:

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☐ The extension fee has already been filled in this application.

☒ (b) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account **50-1078** the sum of \$500.00. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account **50-1078** pursuant to 37 CFR 1.25.

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Typed Name: Chasity C. Rossum

Signature: 

Respectfully submitted,

Marvin Glenn Wong, et al.

By 

\_\_\_\_\_  
Gregory W. Osterloth  
Attorney/Agent for Applicant(s)

Reg. No. 36,232

Date: February 23, 2006

Telephone No. (303) 291-3204



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Appl. No. : 10/620,127 Confirmation No. 7853  
Appellant : Marvin Glenn Wong, et al.  
Filed : July 15, 2003  
TC/A.U. : 2841  
Examiner : Ishwarbhai B. Patel  
  
Docket No. : 10020307-1

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPEAL BRIEF**

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Appl. No.	:	10/620,127	Confirmation No. 7853
Appellant	:	Marvin Glenn Wong, et al.	
Filed	:	July 15, 2003	
TC/A.U.	:	2841	
Examiner	:	Ishwarbhai B. Patel	
Docket No.	:	10020307-1	

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPEAL BRIEF**

This Appeal Brief is submitted in response to the Final Office Action mailed August 23, 2005, and the Examiner's Advisory Action mailed November 16, 2005.

Appellant filed a Notice of Appeal on December 23, 2005.

### **Real Party in Interest**

The real party in interest is Agilent Technologies, Inc., assignee of the above captioned patent application. Agilent Technologies, Inc. is a Delaware Corporation having its principal place of business in Palo Alto, California.

### **Related Appeals and Interferences**

There are no related appeals and/or interferences.

### **Status of Claims**

Claims 1-8 and 21-28 are pending in this application. Claims 1, 3-8, 21, and 23-28 currently stand rejected; and claims 2 and 22 stand withdrawn. The rejections of claims 1, 3-8, 21, and 23-28 are appealed.

A copy of the claims is attached as a Claims Appendix to this Appeal Brief.

Serial No. 10/620,127  
Atty. Docket No. 10020307-1

### **Status of Amendments**

No amendments were filed or entered subsequent to the final office action mailed on August 23, 2005.

## **Summary of Claimed Subject Matter**

The invention is variously embodied. Two embodiments are summarized below.

In one embodiment, an air bridge (FIGS. 2 & 3; 108; p. 5, lines 8-22) is produced (FIG. 4) by: I) depositing (400; p. 3, lines 3-11) one or more circuit components (FIGS. 1-3; 102; p. 3, lines 3-11) on a substrate (FIGS. 1-3; 100; p. 3, line 5); II) depositing (405; p. 3, lines 12-25) a sacrificial material (FIGS. 1 & 2; 104; p. 3, lines 12-25; p. 4 line 16; p. 4, line 22 – p. 5 line 7) over at least a portion of the circuit components (FIGS. 1-3; 102; p. 3, lines 3-11); III) depositing (410; p. 4, lines 1-21) a crossover circuit trace (FIGS. 1-3; 106; p. 4, lines 1-21) of uniform composition (FIGS. 2 & 3) over the sacrificial material (FIGS. 1 & 2; 104; p. 3, lines 12-25; p. 4 line 16; p. 4, line 22 – p. 5 line 7), the crossover circuit trace (FIGS. 1, 2, & 3; 106; p. 4, lines 1-21): i) conforming (FIGS. 2 & 3) to the sacrificial material (FIGS. 1 & 2; 104; p. 3, lines 12-25; p. 4 line 16; p. 4, line 22 – p. 5 line 7); and ii) crossing over (FIGS. 1-3; p. 4, lines 1-3) the circuit components (FIGS. 1-3; 102; p. 3, lines 3-11); and IV) thermally decomposing (415; p. 4 line 22 – p. 5 line 7) the sacrificial material (FIGS. 1 & 2; 104; p. 3, lines 12-25; p. 4 line 16; p. 4, line 22 – p. 5 line 7).

In a second embodiment, an air bridge (FIGS. 2 & 3; 108; p. 5, lines 8-22) is produced (FIG. 4) by: I) depositing (400; p. 3, lines 3-11) one or more circuit components (FIGS. 1-3; 102; p. 3, lines 3-11) on a substrate (FIGS. 1-3; 100; p. 3, line 5); II) depositing (405; p. 3, lines 12-25) a sacrificial material (FIGS. 1 & 2; 104; p. 3, lines 12-25; p. 4 line 16; p. 4, line 22 – p. 5 line 7) over at least a portion of the circuit components (FIGS. 1-3; 102; p. 3, lines 3-11); III) depositing (410; p. 4, lines 1-21) a crossover circuit trace (FIGS. 1-3; 106; p. 4, lines 1-21) of uniform composition (FIGS. 2 & 3) over the sacrificial material (FIGS. 1 & 2; 104; p. 3, lines 12-25; p. 4 line 16; p. 4, line 22 – p. 5 line 7), the crossover circuit trace (FIGS. 1, 2, & 3; 106; p. 4, lines 1-21): i) conforming (FIGS. 2 & 3) to the sacrificial material (FIGS. 1 & 2; 104; p. 3, lines 12-25; p. 4 line 16; p. 4, line 22 –



p. 5 line 7); ii) crossing over (FIGS. 1-3; p. 4, lines 1-3) the circuit components (FIGS. 1-3; 102; p. 3, lines 3-11); and iii) being directly supported (FIGS. 2 & 3) by the substrate on opposite sides (FIGS. 1 & 2) of the sacrificial material (FIGS. 1 & 2; 104; p. 3, lines 12-25; p. 4 line 16; p. 4, line 22 – p. 5 line 7); and IV) thermally decomposing (415; p. 4 line 22 – p. 5 line 7) the sacrificial material (FIGS. 1 & 2; 104; p. 3, lines 12-25; p. 4 line 16; p. 4, line 22 – p. 5 line 7).

**Grounds of rejection to be reviewed on appeal**

1. Whether claims 1 and 21 should be rejected under 35 U.S.C. §102(b) as being anticipated by Tatsuya Tominaga (Japanese Pat. No. 401245547A).
2. Whether claims 1, 3, 4, 21, 23, and 24 should be rejected under 35 U.S.C. §102(b) as being anticipated by Burns (U.S. Pat. No. 3,729,816).
3. Whether claims 5-8 and 25-28 should be rejected under 35 U.S.C. §103(a) as being unpatentable over Burns (U.S. Pat. No. 3,729,816), as applied to claims 1 and 21 above, and further in view of Middlehurst et al. (U.S. Pat. No. 6,604,967) alternately Leigh et al. (U.S. Pat. No. 5,986,893).

## Argument

**1. Whether claims 1 and 21 should be rejected under 35 U.S.C. §102(b) as being anticipated by Tatsuya Tominaga (Japanese Pat. No. 401245547A).**

Claim 1 recites:

An air bridge produced by:

- depositing one or more circuit components on a substrate;
- depositing a sacrificial material over at least a portion of the circuit components;
- depositing a crossover circuit trace of uniform composition over the sacrificial material, the crossover circuit trace i) conforming to the sacrificial material, and ii) crossing over the circuit components; and
- thermally decomposing the sacrificial material.

With respect to claim 1, the Examiner asserts, in part, that:

Regarding claim 1, the claim is drafted as a Product-by-Process. The process steps in the claim define the following device: **an air bridge having: one circuit component on a substrate, a crossover circuit trace of uniform composition, crossing over the circuit component.** The sacrificial material on which a crossover trace is formed, as recited on line 3-6 of the claim, is deposited and then decomposed and removed. Therefore the sacrificial material will not be present in the device of claim 1. Further, the device can be made using a sacrificial material or without using a sacrificial material. Furthermore, a process limitation defines the claimed invention over the prior art only to the degree that it defines the product itself. A process limitation cannot serve to patentably distinguish the product over the prior art, in the case that the product is the same as, or obvious over, the prior art. . .

. . . Tatsuya Tominaga, in figure 3, discloses an air bridge having: one circuit component (2) on a substrate (1), a crossover circuit trace (4) of uniform composition (as can be seen in the figure), crossing over the circuit component (2). As such Tatsuya Tominaga discloses all of the structural elements of the device of claim 1 and therefore, Tatsuya Tominaga anticipates the claim.

8/23/05 Office Action, pp. 2-3, sec. 2.

Claim 21 is rejected on a similar basis.

In rejecting claims 1 and 21, the Examiner reads out the steps of depositing and thermally decomposing a sacrificial material because, in the Examiner's opinion, these steps do not impart any structural limitations on the end product - i.e., a circuit trace crossing over a circuit component to form an air bridge. However, Appellants believe the Examiner is construing MPEP §2113 and §2173.05(p) too broadly. That is, the "distinctive structural characteristic" that a manufacturing process step needs to impart to a final product for the final product to distinguish over the prior art can be small.

MPEP §2113 states, in part:

The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re Garner*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979) (holding "interbonded by interfusion" to limit structure of the claimed composite and noting that ***terms such as "welded," "intermixed," "ground in place," "press fitted," and "etched" are capable of construction as structural limitations.***).

(Emphasis added).

Of note, MPEP §2113 mentions that the term "etched" is capable of imparting a structural limitation. Yet, etching is just a means to remove (and not add) material. Furthermore, etching is just one of a plurality of ways to remove material.

If "etching" has been found to impart a structural limitation, Appellants would guess this is so because of the degree of precision with which "etching" removes material to form a "final product". In a similar manner, Appellants' deposition and thermal decomposition of a "sacrificial material" to form an air bridge imparts a certain degree of precision to a resultant air bridge.

Turning now to Tominaga, the English summary of Tominaga's teachings indicates that Tominaga discloses "a power supply wiring 4" crossing over a "wiring 2", thereby forming a "space 3" therebetween. The English summary of

Tominaga's teachings provides absolutely no indication of how the "space 3" or "wiring 4" is formed. In Appellants' claims 1 and 21, a "crossover circuit trace" is formed by depositing the crossover circuit trace over a sacrificial material such that the crossover circuit trace "conforms to" the sacrificial material. The sacrificial material is then thermally decomposed. In this manner, Appellants can precisely define the cross-section of an air bridge. That is, even though the sacrificial material does not appear in the claimed product, the shape of the sacrificial material, prior to its decomposition, provides a reference which precisely defines the shape (i.e., structure) of the resultant "crossover circuit trace" of the final product. Based on the English summary of Tominaga's teachings, the degree of precision with which Tominaga may define an air bridge is unknown, and it is merely speculation that Tominaga can achieve the same degree of precision offered by Appellants' air bridge production process using a "sacrificial material" that precisely predefines the shape of a resultant cross-over circuit trace.

Similarly to the structural limitations that the court indicated were implied by the *Garnero* process, Appellants believe the structural limitations implied by their own process distinguish their "product" from Tominaga's product. Appellants' claims 1 and 21 are therefore believed to be allowable over Tominaga's teachings.

If Appellants' claim 1 is allowed, Appellants request the reinstatement and allowance of their claim 2 (which depends from their claim 1, but which stands withdrawn as being drawn to a non-examined species).

**2. Whether claims 1, 3, 4, 21, 23, and 24 should be rejected under 35 U.S.C. §102(b) as being anticipated by Burns (U.S. Pat. No. 3,729,816).**

Claim 1 recites:

An air bridge produced by:  
depositing one or more circuit components on a substrate;

depositing a sacrificial material over at least a portion of the circuit components;  
depositing a crossover circuit trace of uniform composition over the sacrificial material, the crossover circuit trace i) conforming to the sacrificial material, and ii) crossing over the circuit components; and  
thermally decomposing the sacrificial material.

With respect to claim 1, the Examiner asserts, in part, that:

Regarding claim 1, the claim is drafted as a Product-by-Process. The process steps in the claim define the following device: **an air bridge having: one circuit component on a substrate, a crossover circuit trace of uniform composition, crossing over the circuit component.** The sacrificial material on which a crossover trace is formed, as recited on line 3-6 of the claim, is deposited and then decomposed and removed. Therefore the sacrificial material will not be present in the device of claim 1. Further, the device can be made using a sacrificial material or without using a sacrificial material. Furthermore, a process limitation defines the claimed invention over the prior art only to the degree that it defines the product itself. A process limitation cannot serve to patentably distinguish the product over the prior art, in the case that the product is the same as, or obvious over, the prior art. . .

. . . Burns, in figure 5, discloses an air bridge having: one circuit component (23) on a substrate (21), a crossover circuit trace (29) of uniform composition (as made of same conductive material), crossing over the circuit component (23). As such Burns discloses all of the structural elements of the device of claim 1. Therefore, Burns anticipates the claim.

8/23/05 Office Action, pp. 4-5, sec. 3.

Claim 21 is rejected on a similar basis.

Again, the Examiner seems to downplay the product-by-process limitations of Appellants' claims 1 and 21.

In Appellants' claim 1, a sacrificial material is thermally decomposed to leave a "crossover circuit trace" crossing over "one or more circuit components". Although Burns teaches a "crossover member 16" that spans a conductive element 13, Burns also teaches that the crossover member 16 is formed on a "carrier member 20" and then transferred to and bonded to conductive elements 12 and 14 on either side of the conductive element 13 which is spanned by the crossover member 16. See, Burns, col. 2, lines 51-63. In Appellants' claims 1

and 21, a “crossover circuit trace” is formed by depositing the crossover circuit trace over a sacrificial material such that the crossover circuit trace conforms to the sacrificial material. The sacrificial material is then thermally decomposed. In this manner, Appellants can precisely define the placement and cross-section of an air bridge. Although Burns’ teachings imply *some* degree of precision for the formation of the crossover member 16, the extra steps to transfer the crossover member 16 from the carrier member 20 to the dielectric substrate 11, and to bond the crossover member 16 to the conductive elements 12 and 14, appear to present alignment, bonding and other tolerance issues which are mitigated or eliminated in Appellants’ claimed products.

Similarly to the structural limitations that the court indicated were implied by the *Garnero* process, Appellants believe the structural limitations (e.g., tolerances) implied by their own process distinguish their “product” from Burns’ product. Appellants’ claims 1 and 21 are therefore believed to be allowable over Burns’ teachings. Appellants’ claims 3, 4, 23 and 24 are believed to be allowable at least for the reason that they depend from claim 1 or 21.

If Appellants’ claim 1 is allowed, Appellants request the reinstatement and allowance of their claim 2 (which depends from their claim 1, but which stands withdrawn as being drawn to a non-examined species).

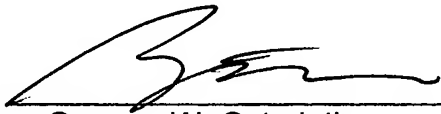
**3. Whether claims 5-8 and 25-28 should be rejected under 35 U.S.C. §103(a) as being unpatentable over Burns (U.S. Pat. No. 3,729,816), as applied to claims 1 and 21 above, and further in view of Middlehurst et al. (U.S. Pat. No. 6,604,967) alternately Leigh et al. (U.S. Pat. No. 5,986,893).**

Appellants believe claims 5-8 and 25-28 are allowable at least for the reason that they depend from allowable claims 1 and 21, and because Middlehurst and Leigh fail to disclose the limitations of parent claims 1 and 21 (see previous argument, *supra*).

#### **4. Conclusion**

In summary, the art of record does not teach nor suggest the subject matter of Appellants' claims 1, 3-8, 21, and 23-28. These claims are therefore believed to be allowable. Because Appellants' claims 1 and 21 are allowable, Appellants request the reinstatement and allowance of their claims 2 and 22 (which depend from their claims 1 and 21, but which stand withdrawn as being drawn to a non-examined species).

Respectfully submitted,  
DAHL & OSTERLOTH, L.L.P.

By:   
Gregory W. Osterloth  
Reg. No. 36, 232  
Tel: (303) 291-3204



## **Claims Appendix**

Claim 1: An air bridge produced by:

depositing one or more circuit components on a substrate;

depositing a sacrificial material over at least a portion of the circuit components;

depositing a crossover circuit trace of uniform composition over the sacrificial material, the crossover circuit trace i) conforming to the sacrificial material, and ii) crossing over the circuit components; and

thermally decomposing the sacrificial material.

Claim 2: The air bridge of claim 1, wherein depositing a sacrificial material comprises depositing the sacrificial material in a manner causing the sacrificial material to be dome shaped.

Claim 3: The air bridge of claim 1, wherein the sacrificial material comprises polynorbornene.

Claim 4: The air bridge of claim 1, wherein the one or more circuit components comprise a circuit trace.

Claim 5: The air bridge of claim 4, wherein the circuit trace comprises a signal trace.

Claim 6: The air bridge of claim 4, wherein the circuit trace comprises a ground trace.

Claim 7: The air bridge of claim 4, wherein the circuit trace comprises a power trace.

Claim 8: The air bridge of claim 1, wherein the crossover circuit trace comprises a signal trace.

Claims 9 – 20 (canceled)

Claim 21: An air bridge produced by:

- depositing one or more circuit components on a substrate;
- depositing a sacrificial material over at least a portion of the circuit components;
- depositing a crossover circuit trace of uniform composition over the sacrificial material, the crossover circuit trace i) conforming to the sacrificial material, ii) crossing over the circuit components, and iii) being directly supported by the substrate on opposite sides of the sacrificial material; and
- thermally decomposing the sacrificial material.

Claim 22: The air bridge of claim 21, wherein depositing a sacrificial material comprises depositing the sacrificial material in a manner causing the sacrificial material to be dome shaped.

Claim 23: The air bridge of claim 21, wherein the sacrificial material comprises polynorbornene.

Claim 24: The air bridge of claim 21, wherein the one or more circuit components comprise a circuit trace.

Claim 25: The air bridge of claim 24, wherein the circuit trace comprises a signal trace.

Claim 26: The air bridge of claim 24, wherein the circuit trace comprises a ground trace.

Claim 27: The air bridge of claim 24, wherein the circuit trace comprises a power trace.

Claim 28: The air bridge of claim 21, wherein the crossover circuit trace comprises a signal trace.

## **Evidence Appendix**

No extrinsic evidence was relied upon to support the arguments herein.

Serial No. 10/620,127  
Atty. Docket No. 10020307-1

### **Related Proceedings Appendix**

Appellants are unaware of any Board or court proceedings related to this Application.